

Remarks

Claims 1-5 are pending in the application. Claims 1-5 have been rejected. The drawings have been objected to by the Examiner. The specification has been objected to because it lacks an Abstract. Claims 1 and 3 are hereby amended. Claims 6 and 7 are hereby added. Support for the new claims is in the specification, e.g., at p. 5, lines 9-11. New drawings are hereby submitted. An Abstract is hereby submitted.

Objections

Drawings

The drawings are objected to because the figures are improperly cross hatched.

Applicants hereby submit amended drawings with proper cross hatching.

Specification

The specification is objected to because it does not contain an abstract on a separate sheet as required.

Applicants hereby submit an Abstract.

Rejections

35 USC § 112, paragraph 2

Claim 1 stands rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards (or Applicants regard) as the invention.

The office action states in part:

In claim 1, "an interface layer interposed between the insulating layer and the first and second conductive layers" is not clear. Is the interface layer between first conductive layer and the insulating layer or the second conductive layer and the insulating layer?

Applicants have amended claim 1 to clarify the location of the interface layer.

Based on the foregoing, Applicant(s) submit that the rejection of claim 1 under 35 U.S.C. § 112, second paragraph, should be withdrawn.

35 USC § 102(b) -Chang

Claims 1 and 2 stand rejected under 35 USC § 102(b) as being anticipated by Chang et al., (US Patent No. 5,774,340).

The office action states in part:

Regarding claim 1, Chang discloses a multi-layer double-sided wiring board comprising:
an insulating layer having an opening formed therein; a first conductive layer formed on an upper surface of the insulating layer (redistribution structure 12 with insulating layer 28, having input / output pads 34 and lines 36 on top surface 30, see figure 1, column 2, line 25-50);

a second conductive layer formed on a lower surface of the insulating layer and covering an inside wall of the opening and a portion of the first conductive layer which is exposed in the opening (plating layer 44/46, see figure 1, column 3, line 1-15); and
an interface layer interposed between the insulating layer and the first and second conductive layers (conductive layer 48, see figure 1, column 3, line 1-10), wherein

the second conductive layer directly contacts the first conductive layer in the opening without the interface layer being interposed there between (plating layer 44 directly in contact with input / output pads 34, see figure 1).

Regarding claim 2, Chang further discloses the second conductive layer directly contacts the insulating layer at the inside wall of the opening without the interface layer being interposed there between, see figure 1.

Applicants submit that “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” MPEP 2131 (citing *Verdegall Bros. V. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

Applicants have amended claim 1 to include the limitation that the interface layer contains a material different from the materials of the first and second conductive layers. The amendment is supported by the specification at, e.g., p. 4, lines 12-15 and p. 5, lines 7-11.

Although the Office Action states that conductive layer **48** of Chang is an interface layer interposed between the insulating layer and the first and second conductive layers, Chang clearly states that element **48** is a ground plane on the surface of insulating layer **28** and is made of the same material as plating layer **44/46** and input/output pads **34** and redistribution lines **36**. See Chang, e.g., at col. 3, lines 43-47 and at col. 4, lines 11-14. Chang does not disclose an interface layer that contains a material different from the materials of the first and second conductive layers. Accordingly, the reference does not describe every element of the claimed invention.

Based on the foregoing, Applicant(s) submit that the cited reference cannot support a 35 U.S.C. 102 (b) rejection and respectfully requests that the rejection be withdrawn.

35 USC § 102(e) - Ishida

Claims 1-2 stand rejected under 35 U.S.C. 102(e) as being anticipated by Ishida (US Patent No. 6,020,561).

The Office Action states in part:

Regarding claim 1, Ishida discloses a multi-layer double-sided wiring board comprising:
an insulating layer having an opening formed therein; a first conductive layer formed on an upper surface of the insulating layer (insulating layer 66b with conductive layer 64b, see figure 3, column 3, line 14-30);

a second conductive layer formed on a lower surface of the insulating layer and covering an inside wall of the opening and a portion of the first conductive layer which is exposed in the opening (conductive layer 68, see figure 3, column 3, line 14-30); and

an interface layer interposed between the insulating layer and the first and second conductive layers (conductive layer 64a, see figure 3, column 3, line 14-30),
wherein the second conductive layer directly contacts the first conductive layer in the opening without the interface layer being interposed there between (conductive layer 68 directly in contact with conductive layer 64b, see figure 3).

Regarding claim 2, Chang further discloses the second conductive layer directly contacts the insulating layer at the inside wall of the opening without the interface layer being interposed therebetween, see figure 3.

Applicants submit that “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” MPEP 2131 (citing *Verdegall Bros. V. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

Applicants have amended claim 1 to include the limitations that the first and second conductive layers are materials having the same conductivity and that the interface layer contains a material different from the materials of the first and second conductive layers. The amendment is supported by the specification at, e.g., p. 4, lines 12-15 and p. 5, lines 7-11.

Ishida does not disclose first and second conductive layers of materials having the same conductivity and an interface layer containing a material different from the materials of the first and second conductive layers. Accordingly, the reference does not describe every element of the claimed invention.

Based on the foregoing, Applicant(s) submit that the cited reference cannot support a 35 U.S.C. 102 (e) rejection and respectfully requests that the rejection be withdrawn.

35 USC § 103 – Chang in view of Arledge

Claims 3-5 stand rejected under 35 USC § 103(a) as being unpatentable over Chang (US Patent No. 5,774,340) as applied to claims 1-2 above, and further in view of Arledge (US Patent No. 5,576,052).

The Office Action states in part:

Regarding claim 3, the applicant is claiming the interface layer contains at least one metallic element selected from the group consisting of nickel, cobalt, zinc, and chromium.

Chang does not disclose such material for the interface layer. However, using such layer, either directly on the metal layer or on the insulating layer is known in the art for better adhesion of the subsequent layer and resultant better conductive connection.

Arledge discloses chromium adhesion promotion layer prior to copper layer, see Arledge, column 2, line 31-45.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Chang with the interface layer containing Chromium, as taught by Arledge, in order to have better adhesion of subsequent copper plating.

Regarding claims 4-5, the applicant is claiming the method steps for the product, which are obvious in view of the product claims as applied to claims 1-3.

According to MPEP 2142, to establish a case of prima facie obviousness, three basic criteria must be met: 1) there must be some suggestion or motivation, either in the references or generally known to one skilled in the art, to modify or combine reference teachings, 2) there must be reasonable expectation of success, and 3) the prior art references must teach or suggest all the claim limitations. The ability to modify the method of the references is not sufficient. The reference(s) must provide a motivation or reason for making the changes. *Ex parte Chicago Rawhide Manufacturing Co.*, 226 USPQ 438 (PTO Bd. App. 1984).

Applicants incorporate by reference their response, above, to the 102 rejection of claims 1-2 based on Chang. Applicants respectfully submit that the references cannot support a case of *prima facie* obviousness as to the claims because, among other possible reasons, the cited references do not provide a motivation or suggest for replacing the ground plane 48 of Chang with an interface layer as described in Arledge.

With further regard to claims 4 and 5, Applicants traverse the rejection because the Examiner has not explained how the method claims are obvious in view of the product claims as applied to claims 1-3.

For these reasons, Applicant(s) submit that the cited references will not support a 103(a) rejection of the claims invention and request that the rejection be withdrawn.

35 USC § 103 – Ishida in view of Arledge

Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al., (US Patent No. 6,020,561) in view of Arledge (US Patent No. 5,576,052).

The Office Action states in part:

Regarding claim 3, the applicant is claiming the interface layer contains at least one metallic element selected from, the group consisting of nickel, cobalt, zinc, and chromium.

Ishida does not disclose such material for the interface layer. However, Ishida discloses that the conductive layers may comprise a multilayered metallurgy, column 3, line 30-31. Further, using adhesion promotion layer or barrier layer, is known in the art for better adhesion of the subsequent layer or stopping the migration of one element of a conductive layer to the other conductive layer.

Arledge discloses chromium adhesion promotion layer prior to copper layer, see Arledge, column 2, line 31-45.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to provide the structure of Ishida with the interface layer containing Chromium, as taught by Arledge, in order to have better adhesion of subsequent copper plating.

Regarding claims 4-5, the applicant is claiming the method steps for the product, which are obvious in view of the product claims as applied to claims 1-3.

According to MPEP 2142, to establish a case of *prima facie* obviousness, three basic criteria must be met: 1) there must be some suggestion or motivation, either in the references or generally known to one skilled in the art, to modify or combine reference teachings, 2) there must be reasonable expectation of success, and 3) the prior art references must teach or suggest all the claim limitations. The ability to modify the method of the references is not sufficient. The reference(s) must provide a motivation or reason for making the changes. *Ex parte Chicago Rawhide Manufacturing Co.*, 226 USPQ 438 (PTO Bd. App. 1984).

Applicants incorporate by reference their response, above, to the 102 rejection of claims 1-2 based on Ishida. Applicants respectfully submit that the references cannot support a case of *prima facie* obviousness as to the claims because, among other possible reasons, the cited references do not provide a motivation or suggest for first and second conductive layers, which

are in direct contact, being made of materials having the same conductivity because Ishida discloses that its contact pad is copper (or a material other than copper), but discloses only that the conductive layer in contact with the contact pad is a conductive material, *see* Ishida at, e.g., col.3, lines 25-32, and Arledge does not address this type of configuration. In addition, these references do not disclose all the elements of the present invention because they do not disclose first and second conductive layers, which are in direct contact, being made of materials having the same conductivity.

With further regard to claims 4 and 5, Applicants traverse the rejection because the Examiner has not explained how the method claims are obvious in view of the product claims as applied to claims 1-3.

For these reasons, Applicant(s) submit that the cited references will not support a 103(a) rejection of the claims invention and request that the rejection be withdrawn.

In addition to the foregoing arguments, Applicant(s) submit that a dependent claim should be considered allowable when its parent claim is allowed. *In re McCairn*, 1012 USPQ 411 (CCPA 1954). Accordingly, provided the independent claims are allowed, all claims depending therefrom should also be allowed.

Based on the foregoing, it is submitted that the application is in condition for allowance. Withdrawal of the rejections under 35 U.S.C. 112, 102 and 103 is requested. Examination and reconsideration of the claims are requested. Allowance of the claims at an early date is solicited.

Respectfully submitted,

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Date

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